



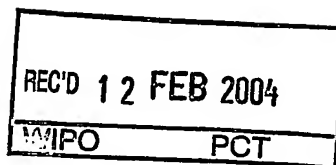
10/530521
FOI/EF U3/11988
Rec'd PTO 07 APR 2005 #2
29 OCT 2003



INVESTOR IN PEOPLE

PRIORITY DOCUMENT

SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)



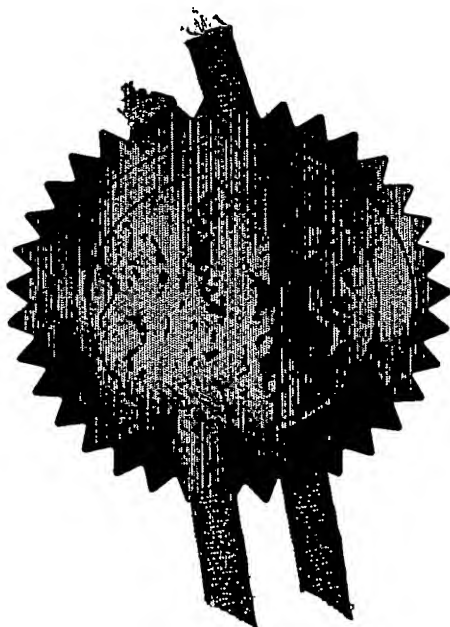
The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



Signed *Andrews*

Dated 16 October 2003

The Patent Office

1/77

06NOV02 E761224-1 D10009
P01/7700 0.00-0225809.3

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

THE PATENT OFFICE
M

05 NOV 2002

RULE 97
NEWPORT

The Patent Office

Cardiff Road
Newport
Gwent NP10 8QQ

1. Your Reference	CGP/P0065		
2. Patent application number (The Patent office will fill in this part)	0225809.3		05 NOV 2002
3. Full name, address and postcode of the or of each applicant (underline all surnames)	MARK ANDREW SANDERS AXIS HOUSE 77A IMPERIAL ROAD WINDSOR SL4 3RU 6902084001		
Patents ADP number (if you know it)			
If the applicant is a corporate body, give the country/state of its corporation			
4. Title of the invention	FOLDING BIKE		
5. Name of your agent (if you have one)	DR CHRISTOPHER GERARD PIKE		
"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)	PIKE & CO. HAYES LOFT 68A HAYES PLACE MARLOW BUCKS SL7 2BT 7497928002		
Patents ADP number (if you know it)			
6. If you are declaring priority from one or more earlier patent applications, give the country and date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number (if you know it)	Date of Filing (day / month / year)
7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application		Date of filing (day / month / year)
8. Is a statement of inventorship and of right to grant a patent required in support of this request? (Answer yes if: a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d))	NO		

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form 0

Description 15 ✓

Claim(s) 2 ✓

Abstract 1 ✓

Drawing(s) 5 + 5 ✓

10. If you are also filing any of the following, state how many against each item.

Priority Documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

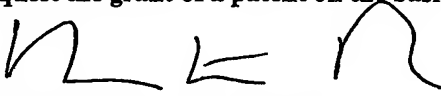
Request for preliminary examination and search (*Patent Form 9/77*) 1 ✓

Request for substantive examination (*Patent Form 10/77*)

Any other documents
(please specify)

11.

I/We request the grant of a patent on the basis of this application


Signature Christopher Gerard Pike
AGENT FOR THE APPLICANTS

04 November 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Dr. Christopher G. Pike
01628 471869

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patent Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered "Yes" Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

Folding cycle

5 The present invention relates to a folding cycle which is readily and reversibly foldable from an 'in use' configuration to a compact 'folded' configuration.

10 Whilst folding cycles are well known in the art, there exist a number of design challenges that are the continuing interest of designers in this field. In particular, it is desirable that the 'folded' configuration of the cycle is of minimal size and of a configuration that accommodates its carrying and/or storage. That configuration desirably also minimises the number of sharp or irregularly-shaped components protruding therefrom, which might otherwise snag on the user causing annoyance and/or minor injury.

15 It is desirable from a space-saving standpoint, that when in the 'folded' configuration, the wheels of the cycle are in close relationship, preferably in registration, with each other. It is particularly desirable, that when so registered the wheels are freely rotatable to enable the 'folded' cycle to be wheeled about by the user thereby avoiding any carrying thereof. Once such wheelable folded
20 cycle is described in UK Patent Application No. 2,171, 656 A1, although this design necessitates the use of small cycle wheels that are less preferred from a user standpoint. For example, smaller wheels can give poorer performance over rough surfaces (e.g. potholes and off-road use). Some users also find small-wheeled cycles more difficult to handle.

25 The present invention provides a frame for a folding cycle accommodating 'normal' sized wheels that is readily and conveniently foldable from an 'in use' configuration to a 'folded' configuration in which the wheels are in close relationship. In a preferred aspect, the wheels are brought into registration as a
30 result of folding the frame thereby enabling the folded cycle to be wheeled about by the user, and avoiding the user having to carry the folded cycle. The invention

derives from the Applicant's appreciation that to achieve an optimal relationship between the (normal-sized) wheels in the 'folded' configuration it is necessary, on moving from the 'in use' configuration, to introduce a spacing step which increases the distance between the front wheel and forward foldable frame portion such that on folding an optimal (e.g. registration) relationship between the front and rear wheels is achievable.

In one development of the invention, there is also provided a coupling between the 'spacing' and 'frame folding' actions such that both may be conducted in tandem, thereby reducing the number of user steps required to fold the cycle from the 'in use' to the compact and optimally, wheelable 'folded' configuration.

According to one aspect of the present invention there is provided a frame assembly for a foldable cycle comprising

a rear frame portion including a mounting for a rear wheel;

a forward frame portion, hingedly connecting to said rear frame portion such that the two are foldable towards each other; and

hingedly connecting to said forward frame portion, a pivot assembly for a mounting arm including a mounting for a forward wheel,

wherein on folding, hinged movement of said pivot assembly relative to the forward frame portion moves said mounting arm to move the forward wheel mounting relative to the forward frame portion.

Preferably, the distance between the forward frame portion and said forward wheel mounting extends.

In one aspect herein, on folding, hinged movement of the pivot assembly relative to the forward frame portion moves said mounting arm such that the distance between the forward and rear wheel mountings extends. That is to say, the wheelbase is lengthened as a consequence of the folding action.

5

The present invention provides a foldable cycle and a frame therefor. The cycle may take any form including town bike, mountain bike, leisure bike, children's bike and racing cycle.

10

It will be appreciated that in fully assembled form the cycle will include wheels, a seat, pedals; a drive mechanism (e.g. crank-drive) and handlebars mounted to the frame. It will also however, be appreciated that it is common to supply cycles in part-assembled form including, at the simplest level, just the frame to which various sub-components are later mounted.

15

The cycle herein is foldable. That is to say, it has generally two configurations comprising an 'in use' configuration in which it may be put to its cycling function by a user and a 'folded configuration' in which it is folded away for ready carrying and/or storage by the user.

20

The term 'frame assembly' herein is used to mean the basic frame for the foldable cycle absent the mounting arm (e.g. dual fork or mono-fork shaped) for the forward wheel. The term 'frame and forward wheel mounting assembly' is used to denote the combination of the 'frame assembly' and 'mounting arm'.

25

Wheels, pedals, seat, handlebars and other sub-components are securable to these assemblies by generally known methods.

30

The rear frame portion includes a mounting for a rear wheel. Suitably, it also defines a mounting for pedals, a crank drive and a seat. In spatial terms, the rear frame portion generally defines a principal plane. Suitably, in use, the rear wheel rotates within that principal plane or within a plane that is coplanar therewith.

The forward frame portion hingedly connects to said rear frame portion such that the two are foldable towards each other. Suitably, the forward and rear frame portions folded close up against each other to minimise the space requirements of the 'folded' configuration. In aspects, abutting and mating engagements relationships are envisaged. In the 'in use' configuration, it will be appreciated that the forward frame portion generally lies within the principal plane defined by the rear wheel frame.

10 A pivot assembly hingedly connects (e.g. via a hinge) to the forward frame portion. The pivot assembly is arranged for pivotable (e.g. rotatable) mounting of a mounting arm that includes a mounting for a forward wheel.

15 The above-described hinge connection of the forward and rear frame portions to each other and of the pivot assembly to the forward frame portion are generally achieved with structurally stiff (e.g. in torsion and bending) hinges. In aspects, this is achievable by the use of wide-spaced hinge bearings and interlocking features that engage in the hinge extended position.

20 Suitably, the mounting arm also includes a mounting for handlebars, which may have any suitable configuration. It will be appreciated that in the 'in use' configuration, the pivot axis defined by the pivot assembly lies within the principal plane defined by the rear frame portion.

25 On folding of the cycle, hinged movement of the pivot assembly relative to the forward frame portion moves it (e.g. forwards or outwards in a relative sense) preferably such that when a mounting arm is pivotally mounted thereto the distance (i.e. spacing) between the forward frame portion and the forward wheel mounting is extended. This is an important aspect of the invention herein
30 because without this movement and spacing action the front wheel mounting is

not sufficiently spaced to allow for optimal positioning thereof in the 'folded' configuration.

5 Preferably, the (e.g. forwards or outwards) movement places sufficient distance (or spacing) between the forward wheel mounting and forward frame portion is such that the act of folding the frame portions towards each other will result in the forward and rear wheel mountings being brought generally into registration with each other. This represents an optimal 'folded' configuration since the wheel mountings (and hence wheels mounted thereto) lie side-by-side. An advantage
10 of this optimal configuration is that the folded cycle may be readily wheeled about both wheels, each of which rotates about the same rotational axis (i.e. wheel axles aligned). In essence, the two wheels side-by-side function as a 'single wheel'. An advantage of this functional aspect is that unlike many other full-sized wheel folding cycles the front wheel does not have to be removed to
15 achieve neat folding.

Preferably, the rear frame portion and pivot assembly are coupled such that folding of the forward and rear frame portions towards each other results in the position of the forward frame portion and forward wheel mounting moving, and
20 preferably extending relative to each other. This coupling enables the 'frame folding' and 'spacing' actions to be conducted in tandem, thereby reducing the complexity and number of steps required to move the cycle from the 'in use' to 'folded' configuration and vice-versa. In one aspect, as the folding motion is conducted the coupling acts to push the forward wheel mounting out and around
25 the frame portions thereby avoiding undesirable interaction with any sub-components of the frame, particularly the pedals and/or crank drive.

Most preferably, the extension (spacing) will be to the optimal position described above in which the complete folding action results in the forward and rear wheel
30 mountings being brought into registration with each other.

The coupling may be provided by any suitable means including a suitably co-mounted coupling element or preferably rigid form such as a single or multi-bar coupling rod.

5 Suitably, the frame assembly is arranged such that the pivot assembly enables the mounting arm to rotate therein such as to accommodate folding of the frame portions. Suitably, the mounting arm is moved to an optimal position to enable the accommodation of the mounting arm in the 'folded' configuration.

10 The mounting arm is generally provided with handlebars (e.g. on a stem mounting). Suitably, on folding, the pivot assembly acts such as to enable the mounting arm with handlebars to rotate therein such as to readily accommodate the arm and handlebars on folding of the frame portions. Suitably, the handlebars or stem mounting therefor are moved to a position that enables their
15 optimal location in the 'folded' configuration.

In one aspect, in the 'folded' configuration, the handlebars or stem mounting therefor are located such as to function as a handle for wheeling about the folded cycle by way of the wheels (in a side-by-side configuration). In other
20 aspects, other parts of the frame assembly or one or more further additional features provide this handle function.

In aspects, any handle is foldable, retractable, rotatable, or otherwise movable to an optimum position (e.g. ergonomic) for ease of wheeling of the folded cycle by
25 a user. Suitably, this movement of the handle to an optimum position is coupled to the overall folding action.

One or more of the hinges or of the coupling elements described above may use an 'over-centre' action such that there is a spring bias which arises either from
30 the hinge/coupling geometry or by the use of spring elements. The spring bias may be to either or both ends of the folding action. Such spring bias may in

aspects, be employed to assist the folding or unfolding action. In other aspects, it may be employed to bias the frame to the 'folded' or 'unfolded' configurations.

5 Suitably, the forward and rear wheel mountings herein take the form of single-sided 'mono-fork' mountings, although more traditional dual-fork mountings may also be employed. The advantage of using 'mono-fork' mountings is that the wheels are enabled to locate nearer to each other in the 'folded' configuration, thereby further saving space. It will be appreciated that where 'mono-forks' mountings are employed the forward and rear wheel mountings will be arranged
10 as a mating pair to enable close wheel location on folding.

Suspension systems may be provided to any wheel mountings; most suitably in conjunction with 'mono-fork' wheel mountings.

15 Suitably, the hubs of the wheels may lock lightly or more engagedly together in the 'folded' configuration. One or more latches may be provided thereto or elsewhere on the frame of any suitable form including magnetic latches, mechanical latches, sprung latches, interference fit latches, retracting ball latches, press-stud latches and Velcro (trade name) type latches.

20 The wheels of the cycle may be arranged to be removable on folding, thereby further reducing the size of the 'folded' configuration.

25 The rear wheel frame portion is generally provided with a mounting for a seat stem upon which a seat is accommodated. The seat stem is suitably adjustable in both up/down and back/forward senses and may be provided with various locking mechanisms. In aspects, the seat stem retraction or removal may be independent or it may be coupled in some way to the main folding action.

30 In one aspect, the frame assembly is provided with an energy storage device capable of releasing power to assist the folding or unfolding action. Examples of

such devices include compressed air devices, electrical devices, stored spring energy devices, batteries and servomotors.

5 In aspects, the handlebars and/or stem mounting therefore may retract or be removable. The retraction or removal thereof may be independent or it may be linked or coupled in some way to the cycle folding action.

10 The frame assembly and any additional components of the foldable cycle may be made from any suitable material including metals, woods, composites, plastic polymeric materials and any combinations thereof. Suitably, materials are selected for their low-weight, stiffness and robustness properties.

15 The frame assembly may additionally be provided with other features such as luggage carriers, enclosures and motor powering (e.g. electric motor).

According to another aspect of the present invention, there is provided a frame and forward wheel mounting assembly for a foldable cycle comprising

20 a rear frame portion including a mounting for a rear wheel;

a forward frame portion, hingedly connecting to said rear frame portion such that the two are foldable towards each other;

25 hingedly connecting to said forward frame portion, a pivot assembly for a mounting arm; and

pivotaly connecting to said pivot assembly, a mounting arm including a mounting for a forward wheel

wherein on folding, hinged movement of said pivot assembly relative to the forward frame portion moves said mounting arm to move the forward wheel mounting relative to the forward frame portion.

- 5 Preferably, the distance (spacing) between the forward frame portion and said forward wheel mounting extends.

10 In essence, the frame and forward wheel mounting assembly comprises the frame assembly described hereinbefore in combination with the mounting arm for the forward wheel.

According to a further aspect of the present invention there is provided a foldable cycle comprising the frame and forward wheel mounting and additionally forward and rear wheels; handlebars; a drive mechanism; and a seat. Optionally, gearing
15 may be provided to the drive mechanism.

According to other aspects of the present invention there are provided methods for folding and unfolding the frame assembly and frame and forward wheel mounting assembly described herein from an 'in use' to 'folded' configuration.
20

Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

25 Figures 1a to 1h show perspective views of a first folding cycle herein in various stages as the cycle is folded up from the 'in use' configuration (Figure 1a) to the 'folded' configuration (Figure 1h);

30 Figures 2a to 2f show perspective views of a second folding cycle herein in various stages as the cycle is folded up from the 'in use' configuration (Figure 2a) to the 'folded' configuration (Figure 2f); and

Fig 3 shows a perspective view of a detail of a coupled folding mechanism herein.

Referring now to the drawings, in Figures 1a to 1h there is shown a folding cycle 10 herein. Various stages of the folding up action are shown as the cycle is folded up from the 'in use' configuration (Figure 1a) to the fully 'folded' configuration (Figure 1h). Again, for ease of reference and understanding, not all parts are labelled in every drawing, but only the most important parts in relation to the action at that stage of the folding up process.

As may be seen in Figure 1a, the folding cycle 10 comprises a rear frame portion 20 and a front frame portion 30 which are hingedly joined by stiff folding hinge 35 in order that the two frame portions 20, 30 may be folded towards each other. The rear frame portion 20 is also provided with rear wheel mounting 22 in 'mono fork' form to which rear wheel 23 is fixed at hub 24. Also provided to the rear frame portion is seat stem mounting 26 which receives adjustable seat stem 27 and seat 28. Further provided to the rear frame portion are pedals 29a and 29b which drive crank 31 which in turn is provided with a chain (not visible) for driving rear wheel 23. The front frame portion 30 is provided with pivot assembly 32 to which it hingedly connects via hinge 33 which (as more clearly shown in Figure 1b) allows for hinged motion thereof about a horizontal axis. Mounting arm 40 pivotally connects to pivot assembly 32. The mounting arm is provided with handlebars 46 and 'mono-fork' form wheel mounting 42 for front wheel 44 which connects thereto at a hub (not visible). The pivot assembly 32 enables rotational movement of the mounting arm 40 and front wheel 44 and handlebars 46 on a stem mounting 47 associated therewith.

Figure 1b shows a first stage of the folding action. The mounting arm 40 is hingedly rotated about hinge 33 such that the front wheel 44 is pushed forwards away from the forward frame portion 30 and the handlebars 46 moved backwards. It will thus, be appreciated that the distance between the forward

frame portion 30 and the front wheel 44 is increased. In this aspect, the distance between the front 44 and rear 23 wheels is also increased.

5 In a subsequent stage shown in Figure 1c, the mounting arm 40 is further rotated about hinge 33 such that the front wheel 44 is further distanced from the rear wheel 23. In this position, the mounting arm 40 lies roughly parallel to front frame portion 30.

10 In Figure 1d, the mounting arm 40 is rotated by about 110° clockwise (as shown) such that the handlebars 46 are moved away from the pedals 29a. In Figure 1e, the mounting arm 40 is rotated by almost 180° clockwise (as shown) from its original position such that on folding, the wheels 23, 24 will be brought into registration with the wheel hubs 24, 43 facing each other.

15 In Figure 1f, the rear frame portion 20 and front frame portion 30 are moved towards each other about folding hinge 35. It will be appreciated, that the handlebars 46 are still positioned well away from the folding path.

20 In Figure 1g, the front 44 and rear 23 wheels are brought into registration with each other. The respective 'mono fork' mountings 22, 42 are located exterior to the wheels 23, 44 thereby ensuring compactness of the folded cycle.

25 In Figure 1h, the fully 'folded' configuration, the seat 28 is retracted and the stem mounting 47 may be seen to protrude thereby providing an effective handle for wheeling the folded form about the wheels 23, 44. The handlebars 46 may also be used as a handle but they may also be retracted or otherwise folded away to make the final folded form even more compact.

30 Figures 2a to 2f show an enhancement of the folding cycle 10 of Figures 1a to 1h in which a coupling is provided to guide the folding up action. Again, various stages are shown as the cycle is folded up from the 'in use' configuration (Figure

2a) to the fully 'folded' configuration (Figure 2f). For ease of reference and understanding, not all parts are labelled in every drawing, but only the most important parts in relation to the action at that stage of the folding up process.

5 As may be seen in Figure 2a, the folding cycle 110 comprises a rear frame portion 120 and a front frame portion 130 that are hingedly joined by stiff folding hinge 135 in order that the two frame portions 120, 130 may be folded towards each other. The rear frame portion 120 is also provided with rear wheel mounting 122 in 'mono fork' form to which rear wheel 123 is fixed at hub 124. Also
10 provided to the rear frame portion is seat stem mounting 126 which receives adjustable seat stem 127 and seat 128. Further provided to the rear frame portion are pedals 129a and 129b which drive crank 131 which in turn is provided with a chain, belt, shaft (not visible) or other means for driving rear wheel 123. The front frame portion 130 is provided with pivot assembly 132 to
15 which it hingedly connects via hinge 133 which allows for hinged motion thereof about a horizontal axis. Coupling rod 150 is fixed to both rear frame portion 120 and pivot assembly 132 to provide a coupling therebetween. Mounting arm 140 pivotally connects to pivot assembly 132. The mounting arm is provided with handlebars 146 on stem mounting 147 and 'mono-fork' form wheel mounting 142
20 for front wheel 144 that connects thereto at a hub (not visible). The pivot assembly 132 enables rotational movement of the mounting arm 140 and front wheel 144, stem mounting 147 and handlebars 146 that are associated therewith.

25 Figure 2b shows a first stage of the folding action. At folding hinge 135, the rear frame portion 120 and front frame portion 130 hingedly move towards each other (motion A). At pivot assembly 132, the mounting arm 140 is rotated clockwise (motion B) such that the wheels 123, 144 remain approximately parallel and the handlebars 146 are moved out and away from the folding parts. At hinge 133,
30 the mounting arm 140 hingedly rotates upwards (motion C) in response to the action of coupling rod 150 acting on the pivot assembly 132 such that the front

wheel 144 is pushed generally forwards and the handlebars 146 move backwards. It will thus, be appreciated that three separate coupled motions are occurring as the frame portions 120, 130 fold together, the net effect of which is to increase the distance (spacing) between the front wheel 144 and forward frame portion 130 and push the front wheel 144 and mounting arm 140 out of the way of the folding action, and in particular away from the pedals 129a. In this example, the distance between the rear and front wheels 123, 144 does not increase because although the mounting arm 140 rotates upwards (motion C) it is also rotating clockwise (motion B) and backwards (motion A) and the net effect of these combined actions is that the wheelbase is marginally reduced during the initial part of the folding action.

In subsequent stage, Figure 2c the three coupled aspects of the folding action are continued further. The rear frame portion 120 and front frame portion 130 hingedly are moved further towards each other. The mounting arm 140 is further rotated clockwise such that the handlebars 146 are moved further out and away from the folding parts. The mounting arm 140 is also further rotated upwards in response to the action of coupling rod 150 acting on the hinged pivot assembly 132 such that the front wheel 144 is pushed out and around.

In Figure 2d, both the rear frame portion 120 and front frame portion 130 and the rear and front wheels 123, 144 are respectively brought into mating relationships with each other. The handlebars 146 remain positioned well away from the folding path.

In Figure 2e, the front 144 and rear 123 wheels are in registration with each other. The respective 'mono fork' mountings 122, 142 are located exterior to the wheels 123, 144 and can then act as a barrier (or part-barrier) to user contact with the wheel hubs and chain (not visible).

In Figure 2f, the fully 'folded' configuration, the seat 128 is retracted (e.g. manually or automatically) and the stem mounting 147 to the handlebars 146 may be seen to protrude thereby providing an effective handle 147 for wheeling the folded form about the wheels 123, 144.

5

It will be appreciated that the nature of the 'spacing action' in the first (Figs. 1a to 1h) and second (Figs. 2a to 2f) folding cycles described above is subtly different in character. In essence, in the first folding cycle the distance (spacing 1) between the front wheel mounting 24 and the forward frame portion 30 and the distance (spacing 2) between the front and rear wheel mountings 24, 43 is first extended and then the cycle is folded. In the second folding cycle, the 'spacing 1' and folding actions are combined whereby the front wheel 144 when being brought into the folded position is generally parallel to the rear wheel 123, and is pushed out side ways to clear the pedals 129a, 129b and then automatically guided to lie alongside the rear wheel 123. In the second folding cycle, the 'spacing 2' action does not occur.

10

15

20

25

In essence, in the context of the second cycle, the coupling rod 150 links the separate 'spacing 1' and 'folding' actions of the first cycle such that the initial spacing of the front wheel mounting 124 and forward frame portion 130 is 'absorbed' into the rest of the actions. In aspects, hinge 133 (which can also be the steering axis) allows the front wheel 144 to remain parallel to the rear wheel 123, and during the folding action allows approx 180 degrees of rotation (of pivot assembly 132). The handlebars 146 clear the frame during the folding action and importantly the front wheel 144 is guided to move alongside the rear wheel 123 thereby clearing the left-hand pedal/crank 129a assembly.

Figure 3 shows a detailed view of coupled folding mechanism herein, which for example, could be employed in the folding cycle of Figures 2a to 2f.

30

Stiff folding hinge 235 hingedly joins foldable rear 220 and front 230 frame portions. Pivot assembly 232 joins to the front frame portion by way of hinge 233, which enables the pivot assembly 232 to be hingedly moved relative to the forward frame portion 230 in a plane of movement defined by the hinge 233. This plane of movement generally corresponds to the (forward) plane defined by the forward frame portion 230. The pivot assembly 232 is also provided with a pivot mounting 231 for mounting arm 240, which enables axial rotation of the mounting arm about axis AB as shown. The mounting arm has front wheel 244 and handlebars 246 attached, and this axial rotation thereby enables steering of the cycle.

Coupling rod 250 joins to rear frame portion 220 at first attachment point 252 and pivot assembly 232 at second attachment point 251. It may thus, be appreciated that any movement of the forward frame portion 230, rear frame portion 220 and pivot assembly 232 will be coupled.

The representation of Figure 3 shows the coupled folding mechanism in a part-folded configuration in which the forward frame portion 230 has been moved towards the rear frame portion 220. As a result of this movement, the coupling rod 250 has acted to push the pivot assembly 232 away from the forward frame portion 230, the pivot assembly 232 moving about hinge 233. The front wheel 244 on mounting arm 240 is thereby pushed out and away from the folding action.

CLAIMS:

1. A frame assembly for a foldable cycle comprising

5 a rear frame portion including a mounting for a rear wheel;

a forward frame portion, hingedly connecting to said rear frame portion such that the two are foldable towards each other; and

10 hingedly connecting to said forward frame portion, a pivot assembly for a mounting arm including a mounting for a forward wheel,

wherein on folding, hinged movement of said pivot assembly relative to the forward frame portion moves said mounting arm to move the forward wheel
15 mounting relative to the forward frame portion.

2. A frame assembly according to claim 1, wherein said mounting arm moves such that the distance between the forward frame portion and said forward wheel mounting extends.

20

3. A frame assembly according to claim 1, wherein said distance between the forward frame portion and forward wheel mounting extends to a point at which folding of the frame portions towards each other will result in the forward and rear wheel mountings being generally brought into registration with each
25 other.

4. A frame assembly according to either of claims 2 or 3, wherein the rear frame portion and hinge mounting assembly are coupled such that folding of the frame portions towards each other results in the distance between the forward
30 frame portion and forward wheel mounting extending relative to each other.

5. A frame assembly according to any of claims 1 to 4, wherein the pivot assembly enables the mounting arm to rotate therein to a position, which readily accommodates folding of the frame portions towards each other.

5 6. A frame and forward wheel mounting assembly for a foldable cycle comprising

a rear frame portion including a mounting for a rear wheel;

10 a forward frame portion, hingedly connecting to said rear frame portion such that the two are foldable towards each other;

hingedly connecting to said forward frame portion, a pivot assembly for a mounting arm; and

15

pivotally connecting to said pivot assembly, a mounting arm including a mounting for a forward wheel

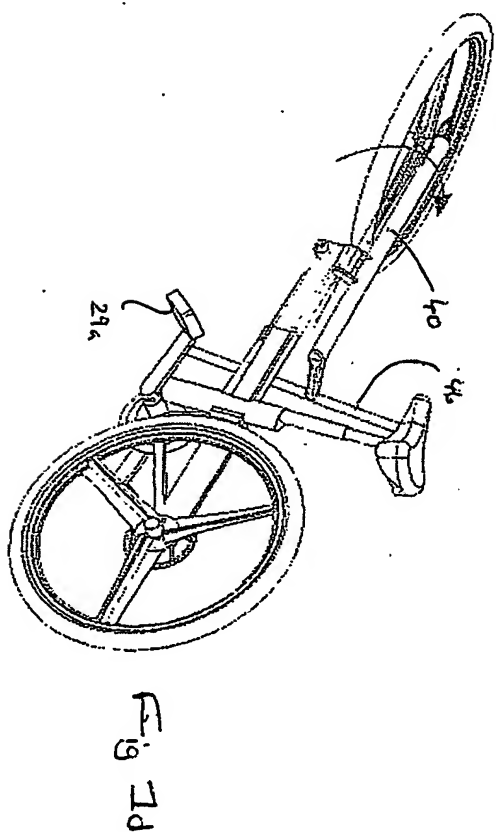
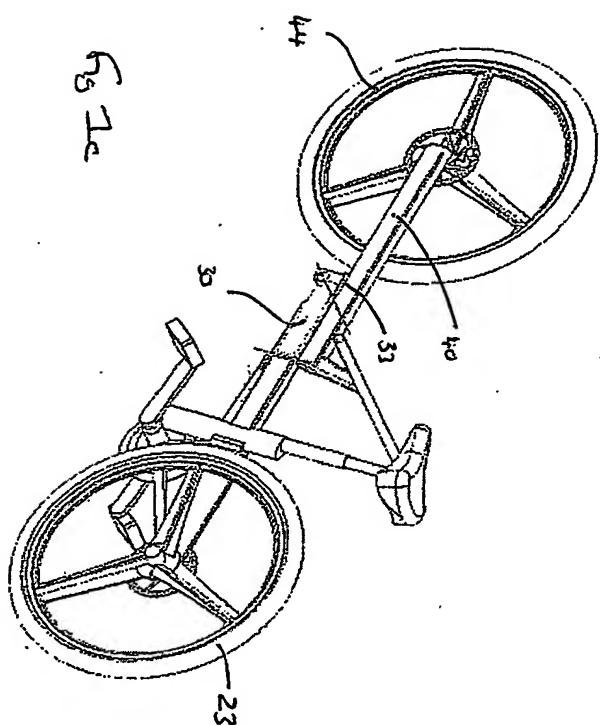
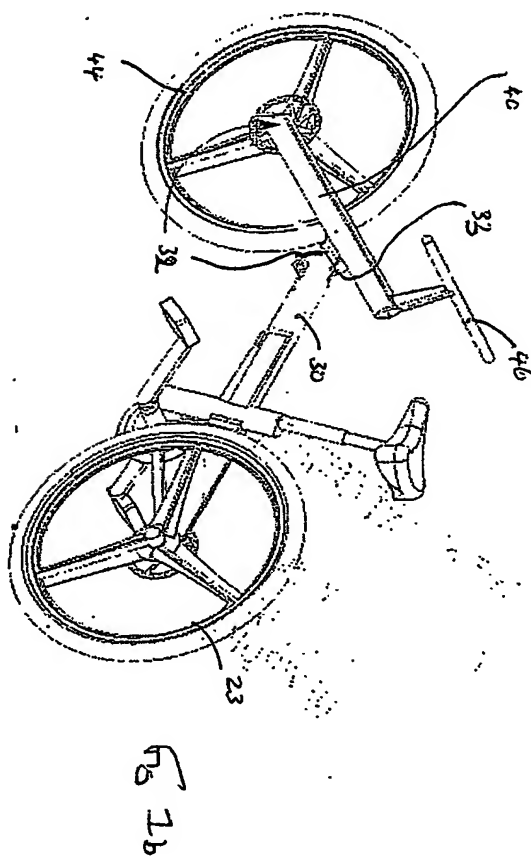
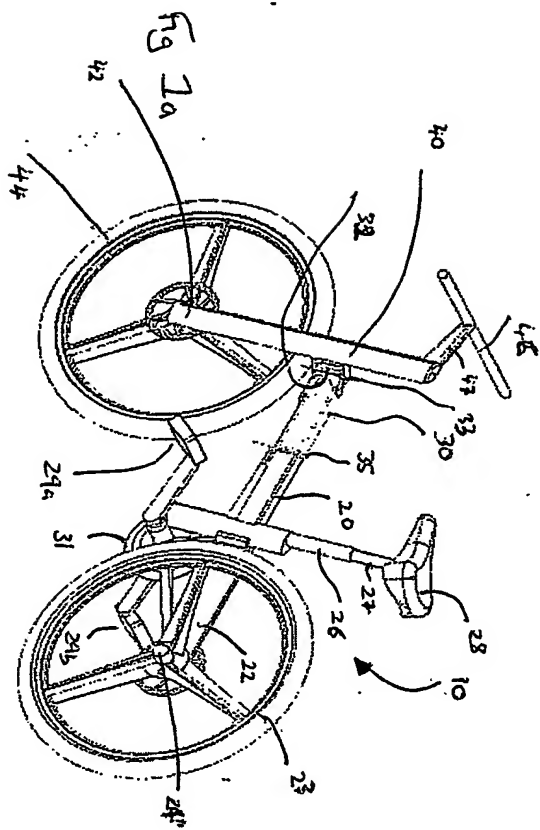
20 wherein on folding, hinged movement of said pivot assembly relative to the forward frame portion moves said mounting arm to move the forward wheel mounting relative to the forward frame position.

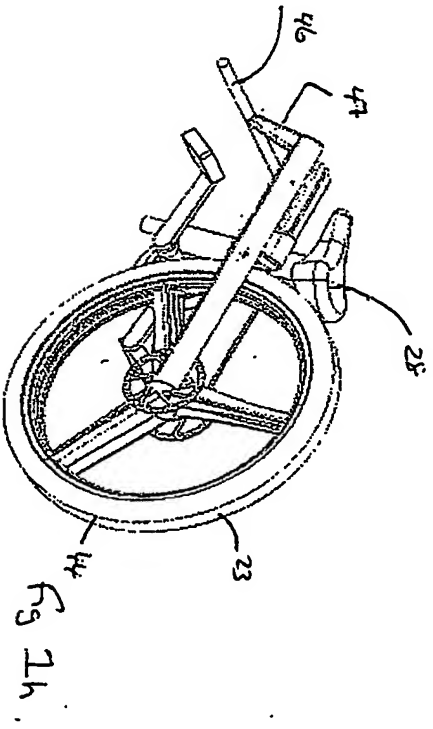
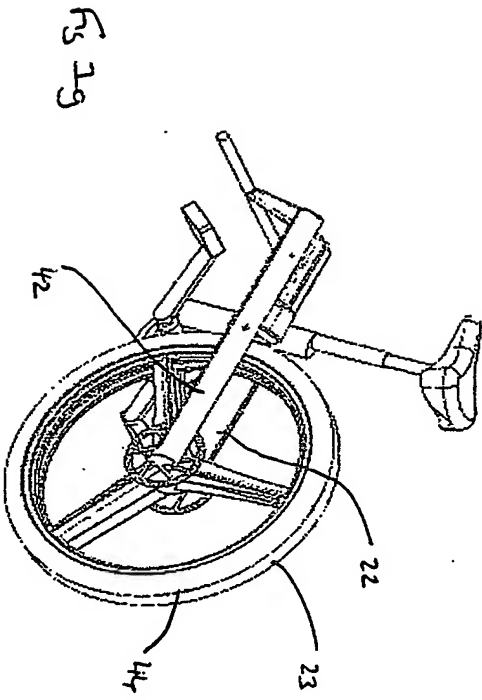
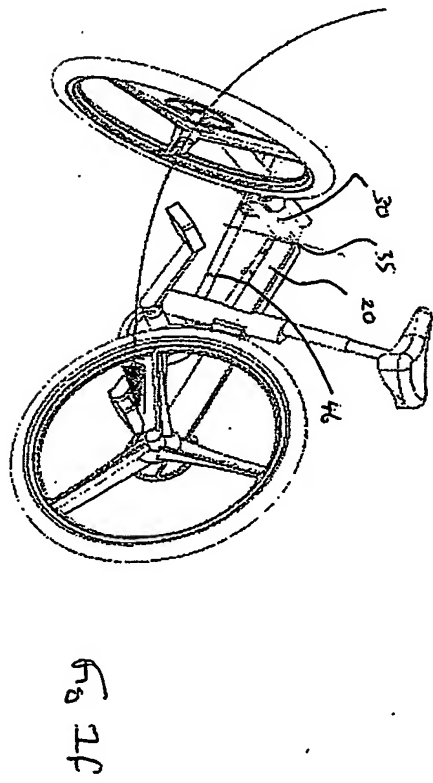
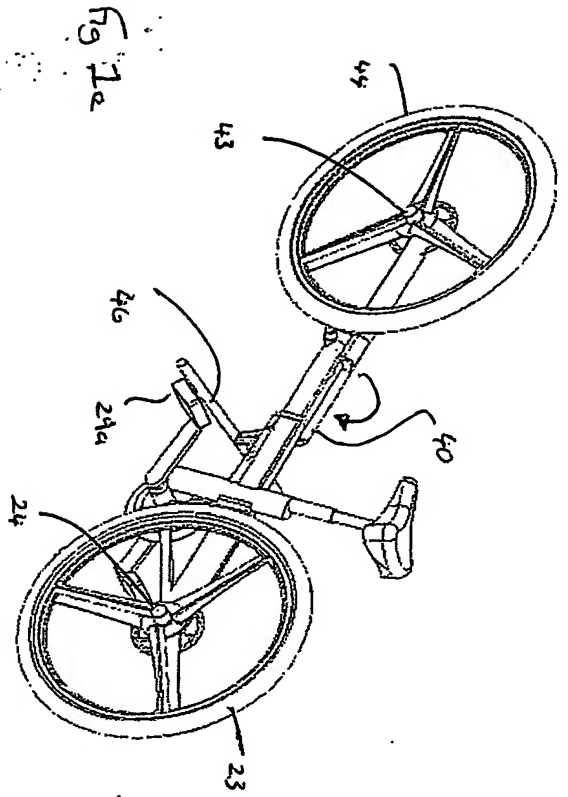
7. A frame and forward wheel mounting assembly according to claim 6, wherein said mounting arm moves such that the distance between the forward
25 frame portion and said forward wheel mounting extends.

30

ABSTRACT

There is provided a frame assembly for a foldable cycle comprising a rear frame portion including a mounting for a rear wheel; a forward frame portion, hingedly
5 connecting to the rear frame portion such that the two are foldable towards each other; and hingedly, connecting to the forward frame portion, a pivot assembly for a mounting arm including a mounting for a forward wheel. On folding of the cycle, hinged movement of the pivot assembly relative to the forward frame portion moves the mounting arm to move the forward wheel mounting relative to
10 the forward frame portion. Suitably, the distance between the forward frame portion and forward wheel mounting extends. A frame and forward wheel mounting assembly and foldable cycle comprising the frame assembly are also provided.





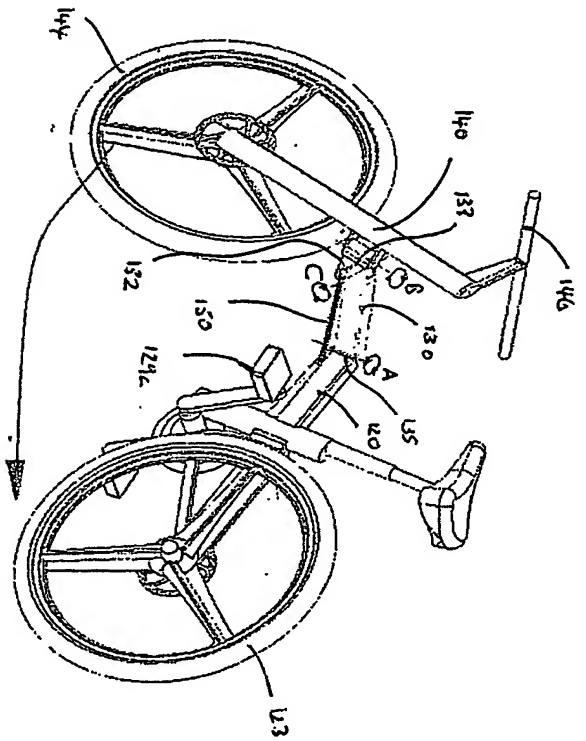
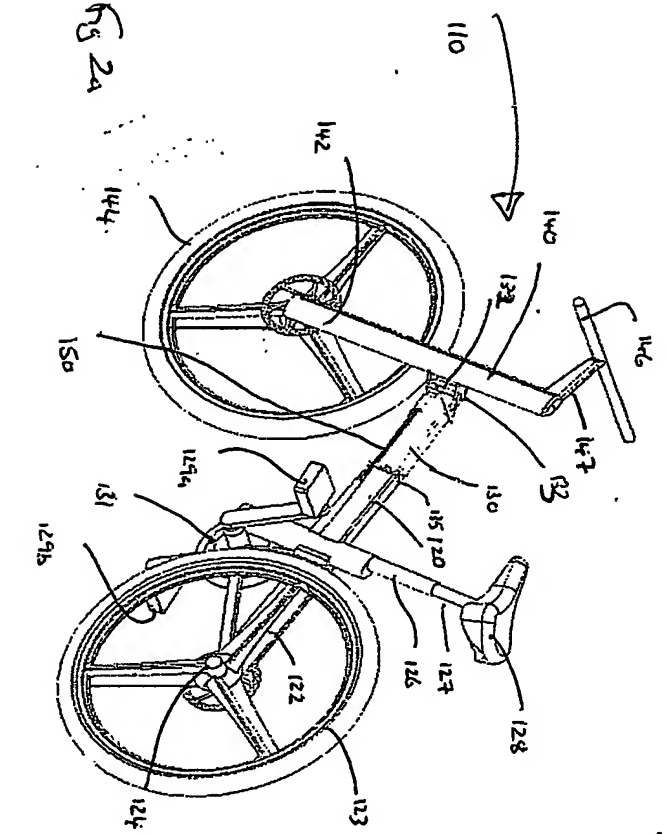


Fig 2b

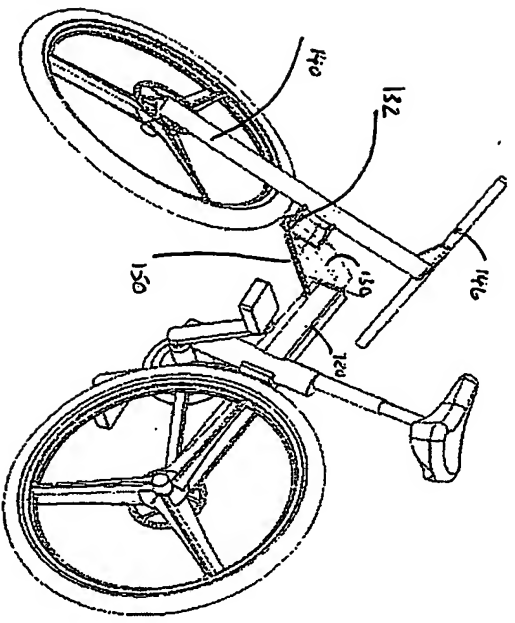


Fig 2c

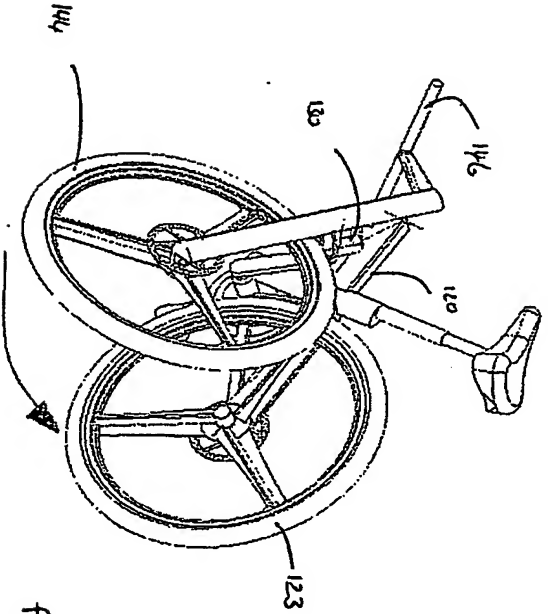


Fig 2d

Fig 2a

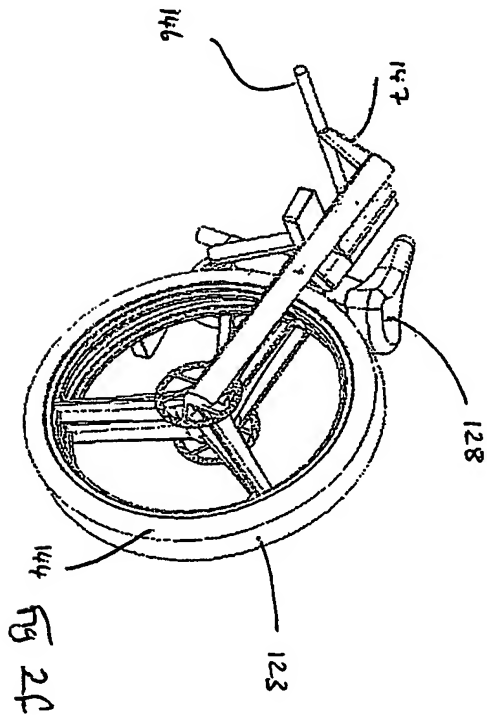
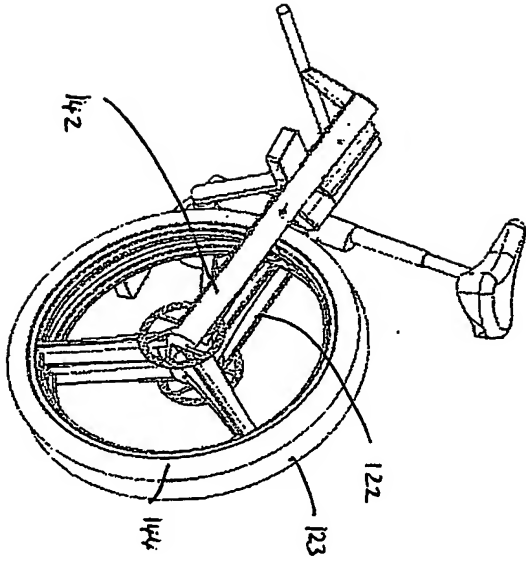


Fig 2b

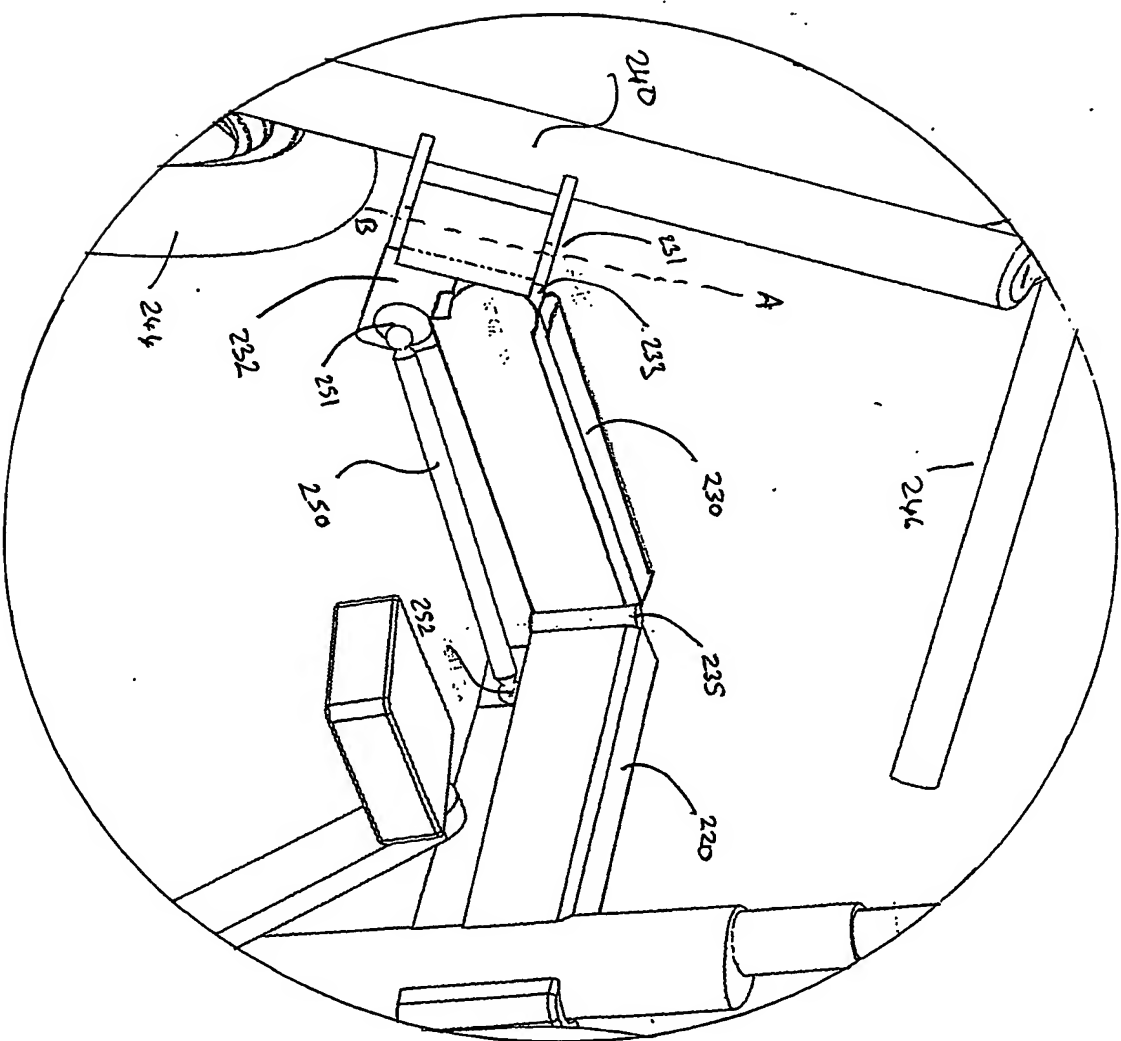


Fig 3

PCT Application
PCT/EP2003/011988

